

What is claimed is:

1 1. A light emitting device that emits visible light caused  
2 by an ultraviolet ray from a discharge generated in a discharge  
3 medium including a rare gas, the light emitting device  
4 comprising:

5 a vessel that is hermetically sealed and contains the  
6 discharge medium;

7 a phosphorous material disposed in the vessel; and

8 one or more photocatalysts that (i) are disposed at one  
9 or more first areas inside the vessel, the first areas being  
10 reachable for one or both of the ultraviolet ray and light emitted  
11 from the phosphorous material, and (ii) are in contact with the  
12 discharge medium.

1 2. The light emitting device of Claim 1, wherein

2 the light emitting device is a plasma display panel,

3 the vessel is made of at least a first substrate and a  
4 second substrate that oppose each other and are sealed together  
5 around edges thereof,

6 a plurality of ribs are formed on the first substrate,

7 in each of at least one of second areas provided between  
8 the ribs, the phosphorous material forms one or more phosphor  
9 layers on one or more walls that surround the second area, and

10           at least one of the photocatalysts is disposed at one  
11 or more positions selected from (i) anywhere in the second area  
12 in which the phosphor layer is formed and (ii) at a top of at  
13 least one of the ribs that sandwich the second area in which  
14 the phosphor layer is formed.

1   3.       The light emitting device of Claim 2, wherein  
2           at least one of the photocatalysts is disposed so as to  
3 be distributed throughout one or more of the phosphor layers.

1   4.       The light emitting device of Claim 2, wherein  
2           the phosphor layers are porous so as to allow the discharge  
3 medium to pass through, and  
4           at least one of the photocatalysts is disposed so as to  
5 be (i) positioned between at least one of the phosphor layers  
6 and the first substrate, and (ii) in contact with the at least  
7 one of the phosphor layers.

1   5.       The light emitting device of Claim 2, wherein  
2           the phosphor layers are porous so as to allow the discharge  
3 medium to pass through, and  
4           at least one of the photocatalysts is disposed so as to  
5 be (i) positioned between at least one of the ribs and the phosphor  
6 layer formed over a surface thereof, and (ii) in contact with

7 this phosphor layer.

1 6. The light emitting device of Claim 2, wherein  
2 at least one of the photocatalysts is disposed at one  
3 or more positions selected from (i) at a top of at least one  
4 of the ribs and (ii) in vicinity of such a top.

1 7. The light emitting device of any of Claims 3, 4, 5, and  
2 6, wherein

3 when absorbing an ultraviolet ray, each phosphor layer  
4 emits light in a color that is common to the phosphor layers  
5 in that second area, the color being one of red, green, and blue,  
6 and

7 at least one of the photocatalysts has an absorption edge  
8 within a wavelength band of the color of blue in a visible light  
9 range and is disposed in vicinity of the phosphor layer that  
10 emits light in the color of blue.

1 8. The light emitting device of any of Claims 3, 4, 5, and  
2 6, wherein

3 when absorbing an ultraviolet ray, each phosphor layer  
4 emits light in a color that is common to the phosphor layers  
5 in that second area, the color being one of red, green, and blue,  
6 the photocatalysts each have an absorption edge in one

7 of two or more wavelength bands that are different from each  
8 other, and  
9 which wavelength band the absorption edge of each  
10 photocatalyst is within is determined according to the color  
11 of the light emitted from the phosphor layer that is disposed  
12 in vicinity thereof.

1 9. The light emitting device of any of Claims 3, 4, 5, and  
2 6, wherein  
3 all the second areas each have at least one of the  
4 photocatalysts disposed therein.

1 10. The light emitting device of any of Claims 3, 4, 5, and  
2 6, wherein  
3 a main component of each of the photocatalysts is  $\text{TiO}_2$   
4 in anatase form.

1 11. The light emitting device of Claim 10, wherein  
2 at least one of the photocatalysts has an absorption edge  
3 within a visible light range.

1 12. The light emitting device of Claim 1, wherein  
2 the light emitting device is a plasma display panel,  
3 the vessel is made of at least a first substrate and a

4 second substrate that oppose each other and are sealed together  
5 around edges thereof, and

6 the one or more photocatalysts are disposed outside an  
7 image display area in which the phosphorous material is disposed.

1 13. The light emitting device of Claim 12, wherein  
2 the photocatalysts are disposed in vicinity of the edges  
3 of at least one of the first and the second substrates.

1 14. A method of manufacturing a light emitting device that  
2 emits visible light caused by an ultraviolet ray from a discharge  
3 generated in a discharge medium including a rare gas, the method  
4 comprising:

5 a precursor preparing step of preparing a precursor of  
6 a phosphor layer by mixing phosphor particles and a  
7 photocatalyst;

8 a precursor disposing step of disposing the precursor  
9 at one or more positions being reachable for the ultraviolet  
10 ray, so that the precursor is in contact with the discharge medium;  
11 and

12 a phosphor layer forming step of forming a phosphor layer  
13 by baking the precursor.

1 15. A method of manufacturing a light emitting device that

2 emits visible light caused by an ultraviolet ray from a discharge  
3 generated in a discharge medium including a rare gas, the method  
4 comprising:

5 a phosphorous material disposing step of disposing a  
6 phosphorous material at one or more positions being reachable  
7 for the ultraviolet ray; and

8 a photocatalyst disposing step of disposing a  
9 photocatalyst at one or more positions being reachable for one  
10 or both of the ultraviolet ray and light emitted from the  
11 phosphorous material, so that the photocatalyst is in contact  
12 with the discharge medium.

1 16. The method of any of Claims 14 and 15, wherein

2 a nitriding process is performed on the photocatalyst  
3 in order to adjust an absorption edge of the photocatalyst.

1 17. A method of manufacturing a plasma display panel in which  
2 a first substrate and a second substrate oppose each other and  
3 are sealed together around edges thereof, the first substrate  
4 having a plurality of ribs formed thereon, the method comprising:

5 a mixture preparing step of preparing a mixture of phosphor  
6 particles and a photocatalyst;

7 a precursor disposing step of disposing the mixture in  
8 at least one of areas provided between the ribs so as to form

9 a precursor of a phosphor layer on one or more of walls that  
10 surround the area; and  
11 a phosphor layer forming step of forming the phosphor  
12 layer by baking the precursor.

1 18. A method of manufacturing a plasma display panel in which  
2 a first substrate and a second substrate oppose each other and  
3 are sealed together around edges thereof, the first substrate  
4 having a plurality of ribs formed thereon, the method comprising:  
5 a phosphorous material disposing step of disposing a  
6 phosphorous material at one or more positions being reachable  
7 for an ultraviolet ray; and  
8 a photocatalyst disposing step of disposing a  
9 photocatalyst at one or more positions on at least one of the  
10 first substrate and the second substrate, the positions being  
11 reachable for one or both of the ultraviolet ray and light emitted  
12 from the phosphorous material, so that the photocatalyst is in  
13 contact with a discharge medium in the plasma display panel.

1 19. The method of any of Claims 17 and 18, wherein  
2 a nitriding process is performed on the photocatalyst.